

A New Species of *Cardamine* (Brassicaceae) from South-eastern Australia and a Key to *Cardamine* in Australia

Ian R. Thompson

School of Botany, The University of Melbourne, Parkville, 3010, Victoria, Australia.

Abstract

A new species *Cardamine tryssa* I.Thomps. from south-eastern Australia is described and illustrated. A key to *Cardamine* species occurring in Australia is also presented.

Introduction

Cardamine L. is a genus of c. 200 species in the Brassicaceae that occurs predominantly in temperate and/or high altitude regions around the world. Twelve indigenous species occur in Australia, mostly in the south-east, and there are four introduced species. During studies of Australian *Cardamine* (Thompson 1996, Thompson & Ladiges 1996) a few specimens similar to but smaller than typical *Cardamine franklinensis* I.Thomps. were examined. Subsequent field collections at a Victorian locality and re-examination of herbarium material from interstate herbaria have consolidated the case for recognizing this entity as a new species.

Taxonomy

Cardamine tryssa I.Thomps., *sp. nov.*

A *Cardamine franklinensis* I. Thomps. caulibus gracilioribus, foliis tenuioribus sine pinnis, inflorescentiis paucifloris, floribus minoribus, differt.

Type: Victoria: SW corner of major bridge on Princes Hwy crossing Toorloo Arm of Lake Tyers. Between Lakes Entrance and Nowa Nowa, 17 Dec. 1995, I.R. Thompson 311 (holotype MEL).

Annual herb to 15 cm high, tap-rooted, glabrous. *Stems* erect, slender, 0.5–0.8 mm diam. *Leaves* mid-green, thin. *Rosette leaves* 5–10, persistent at flowering, simple, 20–80 mm long; petiole 10–60 mm long; lamina elliptic, oblong-elliptic or obovate, 7–20 mm long, 5–10 mm wide; apex obtuse to rounded; base cuneate; margins entire or with 1–3 crenations or lobes per side, the lobes not longer than broad. *Cauline leaves* 0–2, 7–20 mm long; subsessile or petiole to c. 3 mm long; lamina obovate to narrow-elliptic, entire or crenations 1 or 2 per side. *Inflorescences* racemose, indeterminate, of 3–15 flowers; pedicels 2–4 mm long at anthesis. *Flowers* with sepals green or purple, ovate, 1.3–1.8 mm long; petals white internally, usually pink externally, spathulate, 2.5–4 mm long; stamens 6; stigma subsessile at anthesis. *Fruit* with mature pedicels erecto-patent, 5–10 mm long; siliques erect to suberect, linear, 20–25 mm long, 0.7–1 mm wide; style to 1.5 mm long. *Seeds* elliptic, 0.8–1.0 mm long. (Fig. 1.)

Etymology: The epithet alludes to its diminutive nature, slender stems, thin leaves and small flowers (Gk: tryssos, delicate).

Specimens examined: NEW SOUTH WALES: Cave Creek, 1.5 miles [2.4 km] above junction with Goodradigbee River, 11.iv.1968, A. Rodd 592a (NSW). AUSTRALIAN CAPITAL TERRITORY: Near junction of De Salis Creek and Cotter River, Namadgi N.P., 5.xi.1987, P. Gilmour 6248 (CBG). VICTORIA: Forest beside Toorloo Arm (L. Tyers) near Princes Highway Crossing, Sept. 1976, I.C. Clarke 941 & P.G. Ladd (MELU); SW corner of major bridge on Princes Hwy crossing Toorloo Arm of Lake Tyers. Between Lakes Entrance and Nowa Nowa, 3.xi.1995, I.R. Thompson 281, M.F. Duretto & P.G. Neish (MEL). TASMANIA: Pontville, no date, Herb Spicer (MEL).

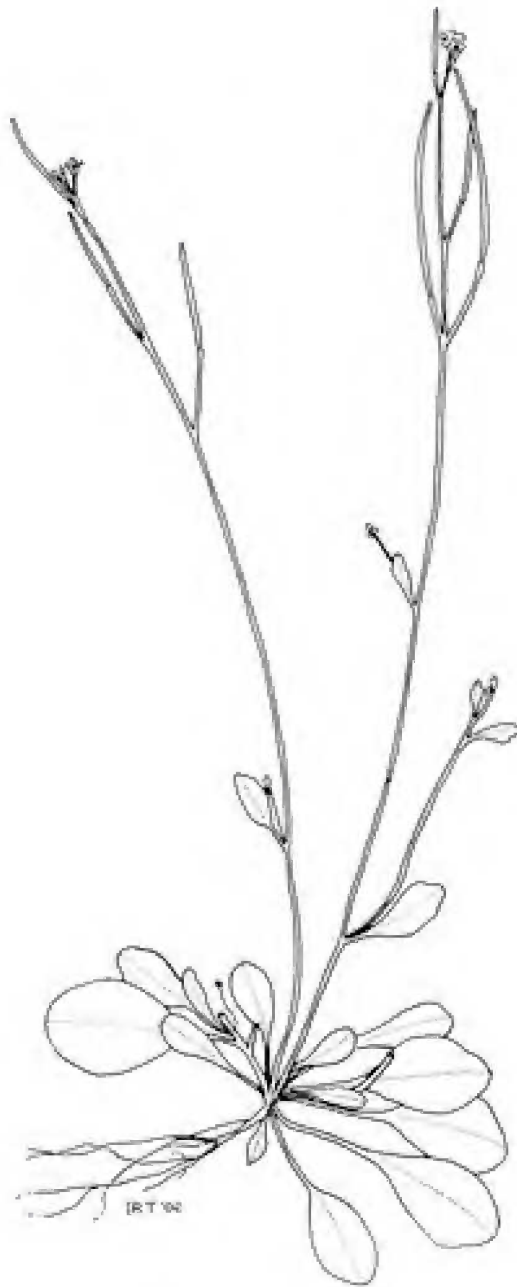


Figure 1. *Cardamine tryssa*, habit. The flowering stems are secondary; and the primary stem has been largely lost. (Holotype: *I.R.Thompson 311*, MEL). Scale bar = 1 cm.

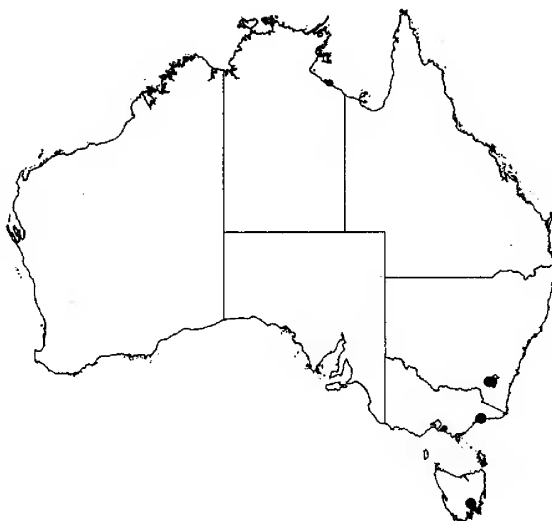


Figure 2. Distribution of *Cardamine tryssa*.

Distribution and Conservation Status. A rare species known from three mainland locations (Fig. 2): near Lake Tyers in East Gippsland, Victoria; from Cave Creek in the Southern Tablelands, N.S.W.; and from De Salis Creek in the A.C.T. There is also an old record from Pontville, in south-east Tasmania. The N.S.W. locality is within Kosciuszko National Park and the A.C.T. locality is within Namadgi National Park.

Habitat. Recorded from areas of limestone geology in open forest. In the East Gippsland location it occurs in open forest adjacent to a river on a moderately steep slope.

Notes. *Cardamine tryssa* is similar to *C. franklinensis* in habit and leaf shape. However, *C. tryssa* is not as robust, has thinner leaves, the rosette leaves do not develop pinnatisect segments, inflorescences are fewer-flowered, and flowers are smaller. *Cardamine tryssa* is readily distinguished from other small-flowered (petals < 5 mm long) species of *Cardamine* in Australia by its leaf morphology. Also, petals of *C. tryssa* are pink abaxially in at least some populations, whereas most other small-flowered species have entirely white petals. An exception is a small-flowered form of *C. lilacina* which has been recorded from eastern Victoria. *C. tryssa* appears to behave largely as an annual, but possibly could persist into a second season.

Key to *Cardamine* in Australia

Note: The term pinnate is used for leaves if well-defined petiolule and blade portions are evident; otherwise the term pinnatisect is used.

- 1 Stems and/or upper surface of leaves at least sparsely haired (close inspection necessary, ideally using low power magnification)
 - 2 Upper surface of leaves (excluding margins) glabrous
 - 3 Terminal segment of lower- to mid-cauline leaves with mostly 2–4 lobes per side, sometimes fewer, l:w > 1.2; siliques erect to sub-erect, forming an angle of < 30° with rachis; natural environments, commonly by streams *C. microthrix*
 - 3: Terminal segment of lower- to mid-cauline leaves with 0–1 lobes per side, or if 2, l:w < 1.2; siliques strongly divergent, forming angle of > 30° with rachis; urban environments (nurseries, garden beds and gutters).....**C. aff. flexuosa*

- 2: Upper surface of leaves (excluding margins) bearing scattered hairs
- 4 Primary stem usually shorter than rosette leaves or lacking and then long-pedicellate flowers arising directly from base; leaves simple or pinnate with 1 or 2 pairs of lateral pinnae; if stem developed, pedicels commonly arising in whorls of 3 or 4; flowers often apetalous or with fewer than 4 petals; siliquas less than 1 mm wide; urban environments**C. corymbosa*
 - 4: Primary stem usually longer than rosette leaves; leaves pinnate with 1–6 pairs of lateral pinnae; pedicels \pm alternating along rachis; flowers usually with 4 petals; siliquas 1–1.5 mm wide; urban or natural environments
 - 5 Stems glabrous or sparsely hairy; cauline leaves 0–3, rarely more, hairs on leaves not obviously tubercle-based; inflorescence rachis straight, developing fruits usually clearly overtopping open flowers; stamens mostly 4; siliquas forming an angle of $< 45^\circ$ with rachis, valves glabrous or hairy; widespread in urban and a range of natural environments**C. hirsuta*
 - 5: Stems sparsely to moderately hairy; cauline leaves mostly > 3 , sometimes fewer if plant stunted, hairs on leaves \pm distinctly tubercle-based; inflorescence rachis often flexuose, developing fruits not or hardly overtopping open flowers; stamens mostly 6; siliquas forming an angle of $> 45^\circ$ with rachis, valves glabrous; urban and sometimes natural environments in moist, shady habitats**C. flexuosa*
- 1: Stems and leaves glabrous
- 6 Perennials, horizontal stem growth extensive, sometimes also much branched and forming dense broad clumps; alpine or sub-alpine
 - 7 Stems slender, 1–2 mm in diam., hardly succulent; ascending stems often unbranched, sometimes few-branched, rosettes not developing where stem turns vertical or rosette leaves up to 6; subalpine to alpine areas of N.S.W. and Vic*C. astoniae*
 - 7: Stems robust, mostly 2–5 mm diam., succulent, ascending stems often few-several-branched, developing \pm loose rosettes of many leaves; endemic to alpine zone of Mt. Kosciuszko region*C. robusta*
 - 6: Annuals, or perennials, extensive horizontal growth lacking, but sometimes rootstock of rosetted perennials elongating in small increments each season, and sometimes branching
 - 8 Stems erect or trailing, to c. 60 cm long; cauline leaves 7–many, pinnatisect, segments of higher leaves \pm linear; petals > 5 mm long; mature style > 1.5 mm long; lowland swamps*C. tenuifolia*
 - 8: Stems erect or ascending, mostly < 30 cm long; cauline leaves mostly 0–6, not divided or division various; petals and mature style various lengths; habitat various
 - 9 Plants developing subtuberous roots; petals white, 5–8 mm long; lowland, western Vic., south-eastern S.A., Tas. (only one collection in past 100 years)*C. gunnii*
 - 9: Plants not developing subtuberous roots; petal colour and length various; lowland to alpine; distribution various
 - 10 Annuals; inflorescences indeterminate, primary inflorescence commonly of > 10 flowers; siliquas forming an angle of $30\text{--}45^\circ$ with rachis; urban environments (nurseries, garden beds, gutters)**C. aff. flexuosa*
 - 10: Annuals or perennials; inflorescences determinate or indeterminate, primary inflorescence of 2–many flowers; siliquas erect or nearly so; natural environments
 - 11 Annuals; rosette usually entirely lost before first fruits mature; all basal leaves with base of terminal blade/segment/pinna attenuate to broad-cuneate; inflorescences from upper cauline leaves commonly

- overtopping the primary inflorescence; inflorescences determinate, mostly 2–7-flowered; lowlying areas; inland plains of N.S.W., Vic., and south-eastern S.A.
- 12 Lower- to mid-cauline leaves undivided and \pm narrow-linear or pinnatisect with 1 or occasionally 2 segments per side; segments unlobed, not narrower at base or base $>1/2$ the width of segment*C. lineariloba*
- 12: Lower- to mid-cauline leaves pinnate or pinnatisect with 2 or 3 pinnae/segments per side; segments often lobed, narrower at base, base $< 1/2$ the width of segment*C. moirensis*
- 11: Annuals or perennials; rosette often more persistent than above; at least the earlier basal leaves with base of terminal blade/segment/pinna truncate to cordate, or if cuneate the terminal blade/ segment/pinna > 7 mm wide and/or cauline leaves entire, l:w c. 3; inflorescences from upper cauline leaves not overtopping the primary inflorescence; inflorescences determinate or indeterminate, 2–many-flowered; habitat and region various but not as above
- 13 Leaves all simple, \pm spatulate, or some pinnatisect, the terminal segment longer than broad, narrow to broad cuneate basally, lateral segments sessile, obovate
- 14 Rosette leaves undivided or usually a proportion with lateral segments; cauline leaves often deeply cleft, sinuses acute; inflorescences of up to 30 or more flowers; sepals 1.8–3 mm long, petals 4–7 mm long*C. franklinensis*
- 14: Rosette leaves undivided; cauline leaves not deeply cleft, sinuses not acute; inflorescences of up to 15 flowers; sepals 1.3–1.8 mm long, petals 2.5–4 mm long*C. tryssa*
- 13: Commonly at least some basal leaves pinnate, terminal pinna, or blade of simple leaves, c. as long as broad, base truncate to cordate
- 15 Perennials, rootstock with persistent leaf bases clustered as evidence of previous seasons' rosettes; petals entirely white or pink abaxially, 4–12 mm long; seeds 1.2–2.5 mm long; hills at moderate altitudes to alpine*C. lilacina*
- 15: Annuals or biennials, rootstock not developing as above; petals white, 2–4 mm long; seeds 0.7–1.3 mm long; lowland to subalpine
- 16 Mid-cauline leaves pinnate, lamina of terminal pinna 6–30 mm wide, frequently 2–4 lobes per side, sometimes fewer; margins of pinnae bearing a few to several minute hairs (thorough inspection with magnification may be required)*C. microthrix*
- 16: Mid-cauline leaves pinnate or pinnatisect, if pinnate, lamina of terminal pinna < 8 mm wide, entire or with 1 shallow lobe per side; margins of pinnae quite glabrous
- 17 Cauline leaves 0–3, if 2 or 3 the uppermost cauline leaf mostly < 2.5 cm long; racemes somewhat congested, rachis finally < 4 cm long; pedicels and rachis sometimes minutely papillose; hilly country to subalpine*C. papillata*
- 17: Cauline leaves 2–6, uppermost cauline leaf mostly > 2.5 cm long; racemes somewhat lax, rachis of at least primary inflorescence commonly finally > 4 cm long; pedicels and rachis never papillose; lowland regions*C. paucijuga*

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